SECTION 00866

TRAFFIC BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Beam guardrail, double beam guardrail, and guardrail transition elements.

B. Precast concrete barriers: standard, half, and terminal section.

C. Cast-in-place concrete barriers.

D. Traffic control cable.

1.2 RELATED SECTIONS

A. Section 01554: Traffic Control

B. Section 02324: Compaction

C. Section 00872: Delineators

D. Section 03055: Portland Cement Concrete

E. Section 03211: Reinforcing Steel and Welded Wire

F. Section 03390: Concrete Curing

G. Section 03392: Penetrating Concrete Sealer

H. Section 05120: Structural Steel

I. Section 06055: Timber and Timber Treatment

1.3 REFERENCES

A. AASHTO M 111: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. AASHTO M 180: Corrugated Sheet Steel Beams for Highway Guardrail.

C. AASHTO M 183: Structural Steel.
D. AASHTO M 270: Structural Steel for Bridges.

PART 2 PRODUCTS2.1 BEAM GUARDRAIL

A. Galvanized beam guardrail elements including bolts in accordance with AASHTO M 180, Class A (0.10 inch thickness) Type 1.

B. Galvanized steel rub or bottom rail on double beam guardrail including bolts and fittings as specified in AASHTO M 183.

C. Galvanizing. AASHTO M 111.

2.2 GUARD RAIL POSTS AND OFFSET BLOCKS

A. As specified.
   1. Steel: Refer to Section 05120
   2. Wood: Refer to Section 06055
   3. Composite or plastic offset blocks for steel post installations
      a. Refer to Section 00867
      a. Certify block meets NCHRP 350 test requirements

2.3 CONCRETE

A. Class AA(AE). Refer to Section 03055.

2.4 REINFORCING STEEL AND WELDED WIRE FABRIC

A. As specified. Refer to Section 03211.

2.5 BARRIER SEAL (FOR PRECAST CONCRETE BARRIER)

A. Polyester polyurethane open-cell foam 100 percent impregnated with asphalt.

B. Foam unit weight requirements:
   1. Before impregnation: 68 lbs/yd^3 to 85 lbs/yd^3.
   2. After impregnation: 252 lbs/yd^3 to 270 lbs/yd^3.

C. Impregnated asphalt foam should return to 95 percent of its original volume when compressed to 25 percent of its volume and released.

D. Impregnated asphalt foam must remain stable at temperatures ranging from -40 degrees F to +150 degrees F.

2.6 TRAFFIC CONTROL CABLE

A. Wood posts: Refer to Section 06055.

B. Polyethylene Tube: Yellow, with outside diameter of 1 3/16 inches with a wall thickness of 0.06 inch. Material and color stabilized for ultraviolet light.

C. Cable: 1/4 inch galvanized aircraft cable (7 x 19) with a breaking strength of 7,000 lbs.

D. Clip: 1/4 inch galvanized wire rope.

2.7 CONCRETE BARRIERS

A. Use the specified reinforcing steel as the reinforcing component. Refer to Section 03211.

B. Hot and cold weather limitations. Refer to Section 03055.

2.8 PRE-CAST CONCRETE BARRIER

A. Pre-qualify the fabricator as a supplier of pre-cast concrete products in accordance with the "Quality Management Plan: Precast-Prestressed Concrete Structures."

B. Mark each barrier with 2 inch numbers indicating the date of casting and identification number supplied by the inspector. Impress 1/4 inch deep into the top center of the barrier.

C. Prevent cracking or damage during handling and storage of precast units. Replace cracked or damaged precast units at no additional cost to the Department.

D. Accept for shipment when:
1. 28-day compressive strength acquired.
2. Cured and sealed according to specification.
3. Visually inspected and accepted by the Engineer.

2.9 BARRIER DELINEATION

A. Sheeting: Refer to Section 00872.

B. Hardware: Refer to Standard Drawing GW 9

1. Plastic Brackets:
   a. High impact thermoplastic, resistant to ultraviolet rays.
   b. Minimum thickness: 0.075 inch.
   c. At break: elongation not to exceed 15 percent, and minimum tensile strength 5,400 psi.
   d. At yield: minimum tensile strength 4,000 psi.

2. Steel bracket: Minimum thickness of 0.075 inch, galvanized steel, AASHTO M111 and as specified.

2.10 SURFACE SEALING MATERIAL (CAST-IN-PLACE CONSTANT SLOPE BARRIER)

A. Refer to Section 03392.

2.11 EXTRUSION AND SLIP FORM MACHINES FOR CAST-IN-PLACE CONSTANT SLOPE BARRIER

A. Capable of vertical adjustment to the grade line while in forward motion.

B. Equipment with an attached grade line gauge or pointer to make a continual comparison with the barrier being place and the offset guide line.

PART 3 EXECUTION

3.1 PREPARATION

A. Site considerations:
   1. Protect work area when removing traffic barriers and end sections until the barriers and end sections are reconstructed or the hazard is mitigated. Refer to Section 01554, Part 1, article, “Plan Requirement”, paragraph F.
   2. Beam Guardrail: Complete grading requirements prior to installation of guardrail and crash cushions.
   3. Precast Concrete Barrier: Complete grading requirements and place any required paved surfaces as per applicable Standard Drawing before installing barrier. Complete grading requirements prior to installation of barrier or crash cushions.

B. For cast-in-place constant slope protection:
   1. Before applying curing compound, give the surface a final soft brush finish with strokes parallel to the line of barriers.
   2. Do not finish with a brush application of grout.
   3. Refer to Section 03392, Part 3, article, “Preparation.”

4. Complete grading requirements prior to installation of crash cushions.

3.2 POSTS

A. Drill all required hole in post and blocks as per Standard Drawing BA 4 prior to installation.

B. Drive posts if satisfactory results are obtained without damaging the post. When posts are driven through asphalt, seal area around posts with asphalt or concrete.

C. Excavate post holes when not driven.
   1. If hole is over excavated, compact approved backfill material into bottom of hole.
   2. Compact backfill material around post to a minimum of 96 percent of maximum laboratory density and dispose of excess material. Refer Section 02324.

D. Traffic control cable:
   1. Set posts so that the top of the posts provides a uniform grade line with no noticeable deviations in elevation.
   2. Notches and saw cuts in the posts may be made before placement in excavated holes. If using the driving method, make the notches and saw cuts after post placement.
      3. Refer to Standard Drawing BA 5 post embedment depth and saw cut requirements.

3.3 RAIL ELEMENTS

A. Punch or drill holes in rail element.
   1. Coat all field drilled rail elements with a field applied cold galvanizing material.

B. Curve rail elements before installation.

3.4 PRE-CAST CONCRETE BARRIERS

A. Installation includes moving, stockpiling, and placing all barriers.

B. Place seal between each barrier unit so that enough pressure is exerted on the sealing material to form and maintain a permanent bond.

3.5 CAST-IN-PLACE CONSTANT SLOPE BARRIER

A. Obtain approval from the Engineer before placing the material.

B. Conform to Standard Drawing BA 3.

C. Fixed forms: Do not use precast mortar blocks to support the reinforcing steel.

D. Constant slope barrier placed by extrusion or slip form:
   1. Provide an offset guide line for the extrusion or slip form machine to maintain the predetermined grade.
   2. Feed concrete to the extrusion or slip form machine at a uniform rate.
   3. Operate machine, uniformly restraining forward motion.
      a. Produce well-compacted, dense concrete with consistency that maintains the shape of the barrier without support.
      b. Produce a well-compacted mass of concrete free from surface pits larger than 1 inch in diameter and requiring no further finishing.
   4. Saw or form joints before applying curing compound.

E. Curing: Refer to Section 03390.

F. Coating:
   1. Application rate based on resident content at a coverage rate of 0.11 lbs/yd^2.
   2. Apply according to the manufacturer's recommendation for horizontal, vertical, and overhead surfaces.
   3. Select a sealer with maximum drying time of 1 1/2 hour.

3.6 TRAFFIC CONTROL CABLE

A. Apply enough tension to eliminate sags greater than 3 inches in the cable.

3.7 BARRIER DELINEATOR

1. Concrete Barrier: Attach L-shaped delineator. Refer to Standard Drawing GW 9.

2. Beam Guardrail: Attach straight delineator. Refer to Standard Drawing GW 9.

3. Attachment Location:
   1. Precast concrete barrier: Refer to Standard Drawing BA 1B.
   2. Precast 1/2 section concrete barrier: Refer to Standard Drawing BA 2.
   3. Constant Slope cast in place barrier: Refer to Standard Drawing BA 3.
   4. Beam Guardrail: Refer to Standard Drawing BA 4.
   5. Traffic Control cable: Refer to Standard Drawing BA 5.

4. Application:
    1. Refer to Standard Drawing GW 10.

END OF SECTION

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